Model-independent cosmological probes

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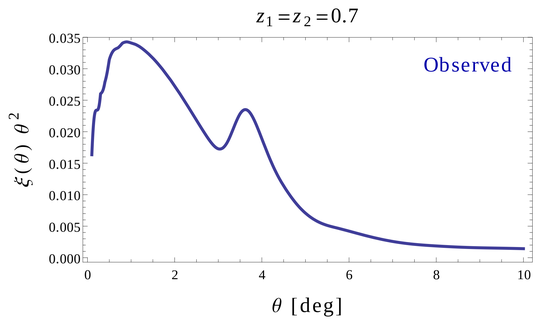
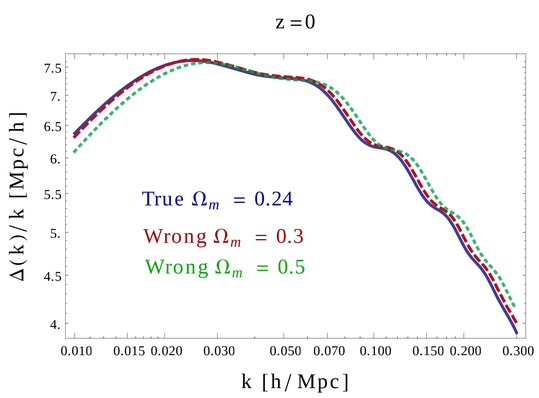
Introduction

When measuring galaxy correlation functions, one usually counts the number of galaxies per unit of angle θ and within a redshift bin around a mean z. Hence to convert $[\theta, z]$ into comoving distances, as usually done, a cosmology must be assumed, inevitably introducing errors.





Here, e.g., the power spectrum is reconstructed in terms of comoving k's from the 2-point correlation function (2PCF) assuming different values of Ω_m. However, this step is not necessary!

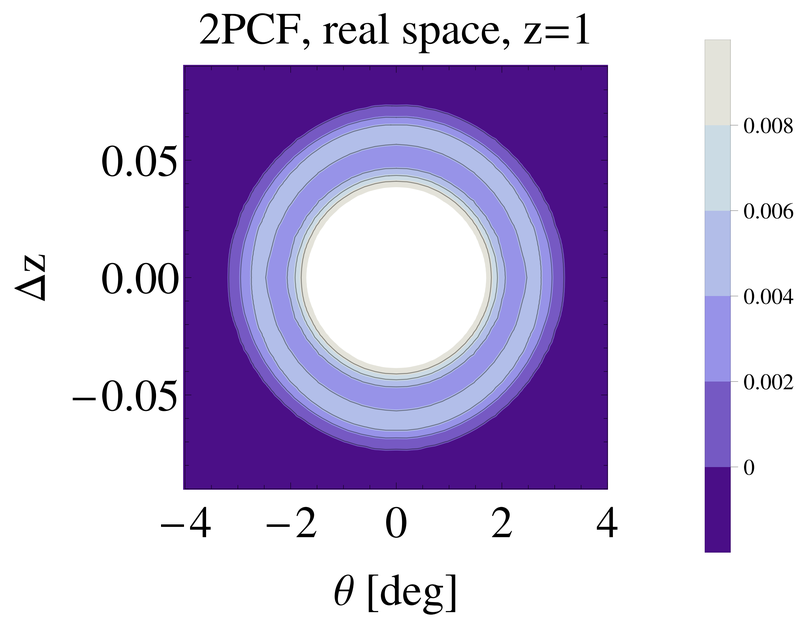
Observable in galaxy survey

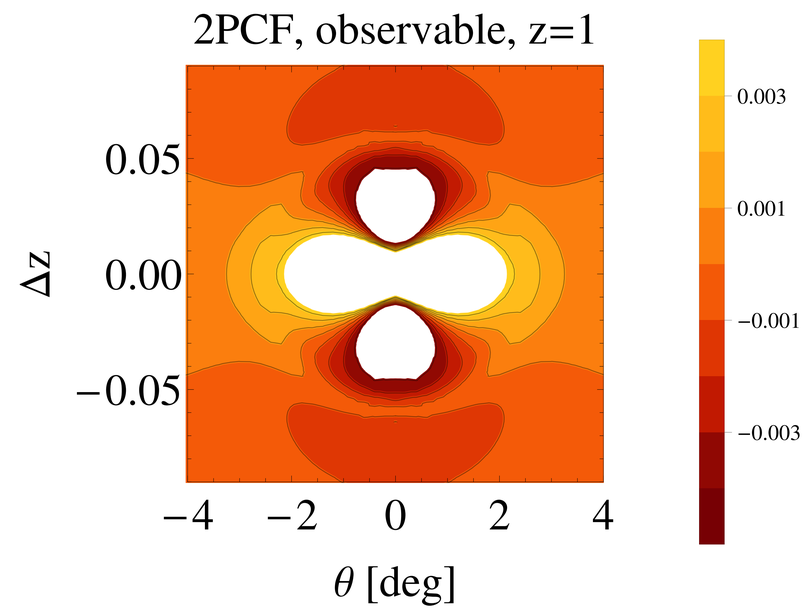
At linear order, the observable gauge-invariant number counts in terms of $[\theta, z]$ takes into account:

- Redshift-space distortions
- Lensing
- Relativistic terms

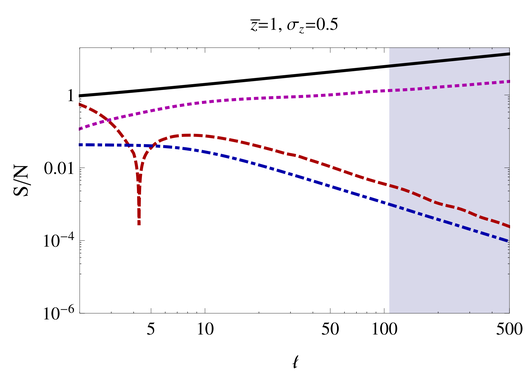
CLASS code for linear galaxy number counts

CLASS has been updated to compute the $C_\ell(z, z')$ for galaxies. From this we obtain:



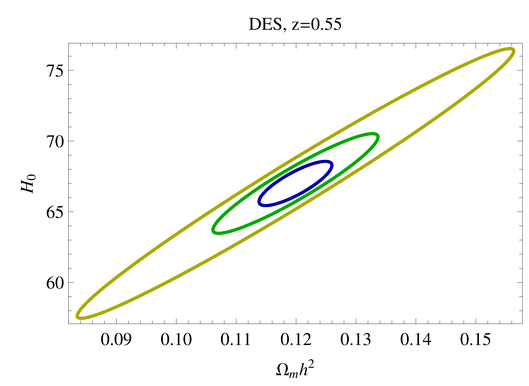


S/N



S/N for Euclid-like catalog: total observable C_ℓ (solid), redshift-space distortion (dashed), lensing (dotted), relativistic terms (dash-dotted). The C_ℓ's are here integrated over a large gaussian redshift bin, note that lensing has S/N>1 already for $\ell > 60$.

Fisher matrices



Error ellipses for a DES-like survey obtained cross-correlating 8, 16 and 32 redshift bins and marginalizing over other parameters.

And more...

- FoM
- Matrices of correlations between bins, angles
- Several choices of window functions and $N(z)$
- Flexible and parallelized code

References

[1] C. Bonvin and R. Durrer, Phys.Rev. **D84**, 063505 (2011), [arXiv:1105.5280],

[2] F. Montanari and R. Durrer, Phys.Rev. **D86**, 063503 (2012), [1206.3545],

[3] E. Di Dio, F. Montanari, R. Durrer and J. Lesgourgues, in preparation (2013).

[4] http://class-code.net/ Update in preparation.